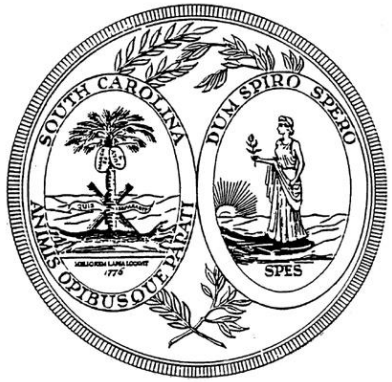
South Carolina Academic Standards and Performance Indicators for Science 2014



Instructional Unit Resource

5th Grade

South Carolina Academic Standards and Performance Indicators for Science 2014
Fifth Grade Science Instructional Unit Resource

As support for implementing the *South Carolina Academic Standards and Performance Indicators for Science 2014*, the standards for Fifth Grade have been grouped into possible units. In the Overview of Units below, the titles for those possible units are listed in columns. Refer to the Overview document to note these unit titles and how Standards, Conceptual Understandings, Performance Indicators, Science and Engineering Practices, and Crosscutting Concepts align. Following the Overview of Units, an Instructional Unit document is provided that delivers guidance and possible resources in teaching our new *South Carolina Academic Standards and Performance Indicators for Science 2014*. The purpose of this document is to provide guidance as to how all the standards in this grade may be grouped into units and how those units might look. Since this document is merely guidance, districts should implement the standards in a manner that addresses the district curriculum and the needs of students. This document is a living document and instructional leaders from around the state will continuously update and expand these resource documents. These documents will be released throughout the 2016-2017 school year with the intentionality of staying ahead of instruction. Teachers should also note that links to the Standards document, A Framework for K-12 Science Education: Practices, Crosscutting Concepts, and Core Ideas, the SEP Support Document, and the Support Document 2.0 are embedded throughout the Instructional Unit format for reference.

Acknowledgments

Jean Baptiste Massieu, famous deaf educator, made a statement that is now considered a French proverb. “Gratitude is the memory of the heart. Indeed, appreciation comes when you feel grateful from the depths of your heart. The head keeps an account of all the benefits you received and gave. But the heart records the feelings of appreciation, humility, and generosity that one feels when someone showers you with kindness.” It is with sincere appreciation that we humbly acknowledge the dedication, hard work and generosity of time provided by teachers and instructional leaders across the state that have made and are continuing to make the Instructional Unit Resources possible.

Grade 5 Overview of Units

Unit 1		Unit 2		Unit 3		Unit 4
PHYSICAL SCIENCE: MATTER AND MIXTURES		EARTH SCIENCE: CHANGES IN LANDFORMS AND OCEANS		LIFE SCIENCE: INTERDEPENDENT RELATIONSHIPS		PHYSICAL SCIENCE: FORCES AND MOTIONS
Standard		**Standard**		**Standard**		**Standard**
5.P.2		5.E.3		5.L.4		5.P.5
Conceptual Understanding		**Conceptual Understanding**		**Conceptual Understanding**		**Conceptual Understanding**
5.P.2.A	5.P.2B	5.E.3A	5.E.3B	5.L.4A	5.L.4B	5.P.5A
Performance Indicators		**Performance Indicators**		**Performance Indicators**		**Performance Indicators**
5.P.2.A.1 5.P.2.A.2	5.P.2B.1 5.P.2B.2 5.P.2B.3 5.P.2B.4 5.P.2B.5 5.P.2B.6	5.E.3A.1 5.E.3A.2	5.E.3B.1 5.E.3B.2 5.E.3B.3 5.E.3B.4	5.L.4A.1 5.L.4A.2	5.L.4B.1 5.L.4B.2 5.L.4B.3 5.L.4B.4	5.P.5A.1 5.P.5A.2 5.P.5A.3 5.P.5A.4 5.P.5A.5
***Science and Engineering Practices**		***Science and Engineering Practices**		***Science and Engineering Practices**		***Science and Engineering Practices**
5.S.1A.2 5.S.1A.3 5.S.1A.4 5.S.1A.6 5.S.1A.7 5.S.1A.8		5.S.1A.1 5.S.1A.2 5.S.1A.3 5.S.1A.4 5.S.1A.6 5.S.1A.8		5.S.1A.2 5.S.1A.4 5.S.1A.6 5.S.1A.7 5.S.1A.8		5.S.1A.1 5.S.1A.2 5.S.1A.3 5.S.1A.4 5.S.1A.7 5.S.1A.8
***Crosscutting Concepts**		***Crosscutting Concepts**		***Crosscutting Concepts**		***Crosscutting Concepts**
2,4,5,7		1,2,4,5,7		1,2,5		2,3,4,7

**Teachers have the discretion to enhance the selected SEP's and CCCs.*

Unit Title
Life Science: Interdependent Relationships in Ecosystems
Standard http://ed.sc.gov/scdoe/assets/file/agency/ccr/Standards-Learning/documents/South_Carolina_Academic_Standards_and_Performance_Indicators_for_Science_2014.pdf
5.L.4 The student will demonstrate an understanding of relationships among biotic and abiotic factors within terrestrial and aquatic ecosystems.

Conceptual Understanding
5.L.4A Ecosystems are complex, interactive systems that include both the living components (biotic factors) and physical components (abiotic factors) of the environment. Ecosystems can be classified as either terrestrial (such as forests, wetlands, and grasslands) or aquatic (such as oceans, estuaries, lakes, and ponds).
New Academic Vocabulary **Some students may need extra support with the following academic vocabulary in order to understand what they are being asked to understand and do. Teaching these terms in an instructional context is recommended rather than teaching the words in isolation. A great time to deliver explicit instruction for the terms would be during the modeling process. Ultimately, the student should be able to use the academic vocabulary in conversation with peers and teachers. These terms are pulled from the essential knowledge portion of the Support Doc 2.0 (http://ed.sc.gov/instruction/standards-learning/science/support-documents-and-resources/) and further inquiry into the terms can be found there.**

Abiotic	Biotic	Aquatic	Terrestrial	Estuary
Ecosystem	Salinity	Populations	Communities	Parasite
Host	Limiting factors	Symbiotic relationships	Niche	

Performance Indicators **Text highlighted below in *orange* and *italicized/underlined* shows connections to SEP's**
5.L.4A.1 *Analyze and interpret data* to summarize the abiotic factors (including quantity of light and water, range of temperature, salinity, and soil composition) of different terrestrial ecosystems and aquatic ecosystems. 5.L.4A.2 *Obtain and communicate information* to describe and compare the biotic factors (including individual organisms, populations, and communities) of different terrestrial and aquatic ecosystems.
***Science and Engineering Practices** **Support for the guidance, overviews of learning progressions, and explicit details of each SEP can found in the Science and Engineering Support Doc (http://ed.sc.gov/scdoe/assets/File/instruction/standards/Science/Support%20Documents/Complete_2014SEPsGuide_SupportDoc2_0.pdf). It is important that teachers realize that the nine science and engineering practices are not intended to be used in isolation. Even if a performance indicator for a given standard only lists one of the practices as a performance**

expectation, scientists and engineers do not use these practices in isolation, but rather as part of an overall sequence of practice. When educators design the learning for their students, it is important that they see how a given performance expectation fits into the broader context of the other science and engineering practices. This will allow teachers to provide comprehensive, authentic learning experiences through which students will develop and demonstrate a deep understanding of scientific concepts.

5.S.1.A.4 Analyze and interpret data from informational texts, observations, measurements, or investigations using a range of methods (such as tabulation or graphing) to (1) reveal patterns and construct meaning or (2) support hypotheses, explanations, claims, or designs
5.S.1.A.8 Obtain and evaluate informational texts, observations, data collected, or discussions to (1) generate and answer questions, (2) understand phenomena, (3) develop models, or (4) support hypotheses, explanations, claims, or designs. Communicate observations and explanations using the conventions and expectations of oral and written language.

***Cross Cutting Concepts** **(http://www.nap.edu/read/13165/chapter/8)**

The link above provides support from the Framework for K-12 Science Education: Practices, Crosscutting Concepts, and Core Ideas (2012) The text in blue and *italicized/underlined* below provides a brief explanation of how the specific content ties to the CCC's.

1. Patterns: The National Research Council (2012) states "observed patterns of forms and events guide organization and classification, and they prompt questions about relationships and the factors that influence them" (p. 84). *Observe patterns which occur throughout ecosystems that allow ecosystems to thrive or regress.*

2. Cause and Effect: The National Research Council (2012) states "events have causes, sometimes simple, sometimes multifaceted. A major activity of science is investigating and explaining causal relationships and the mechanisms by which they are mediated. Such mechanisms can then be tested across given contexts and used to predict and explain events in new contexts" (p. 84). *Observations of how organisms interact in an ecosystem and the effects from the diverse life forms may or may not meet the needs of the ecosystem's ability to be stable.*

5. Energy and Matter: The National Research Council (2012) states "tracking fluxes of energy and matter into, out of, and within systems helps one understand the systems' possibilities and limitations" (p. 84). *Plants get the materials they need for growth from air, soil, and water. The carbon cycle is the repeated movement of carbon in different forms through the environment. Plants take in carbon dioxide and emit oxygen. Then animals take in oxygen and give off carbon dioxide. Through this cycle, plants and animals move carbon dioxide and oxygen into and out of the atmosphere.*

**Teachers have the discretion to enhance the selected SEP's and CCC's.*

Prior Knowledge

- 1.L.5B.1 Basic needs of plants (air, water, sunlight, minerals, space)
- 1.L.6A.5 Protists and fungi obtain energy and explore the environment

- 2.L.5B.3 Animal responses to environment (eating behaviors, hibernation, migration)

Subsequent Knowledge

- 6.L.4A.2 Organisms, hierarchical taxonomic structure
- 6.L.5B.2 Plants participate in photosynthesis, transpiration, and respiration

Possible Instructional Strategies/Lessons

Strategies and lessons that will enable students to master the standard and/or indicator.

- Climate Educator Guide, Activity 2 The Carbon Cycle: How Do Plants use Carbon dioxide? This resource can be found at: http://www.rainforest-alliance.org/curriculum/climate/activity2

- Home Sweet Home: STEM terrarium project Teams of students will construct a shelter to protect them from the rain. They will test the structure and make improvements as needed. This resource can be found at: https://www.teachengineering.org/activities/view/csm_amazon_lesson3_activity1_tg

- Bottle Biology TerrAqua Column What is the Land-Water Connection? Students will work in teams to create an eco-column consisting of both an aquatic and terrestrial ecosystem. This resource can be found at: http://www.bottlebiology.org/investigations/terraqua_main.html

Resources

- Abiotic vs Biotic This is an informative powerpoint concerning biotic/abiotic factors. This resource can be found at: http://www.slideserve.com/lynette/biotic-vs-abiotic

- Biotic and Abiotic This is an another informative powerpoint concerning biotic/abiotic factors. This resource can be found at: http://www.slideshare.net/letz23/abiotic-vs-biotic-web

- Introducing abiotic and biotic lesson: This resource contains a video, quiz, and worksheet on biotic and abiotic factors. This resource can be found at: http://betterlesson.com/community/lesson/31136/introducing-biotic-and-abiotic-factors

- Interactions in an Ecosystem: This is an ecosystem slideshow that is an introduction to this unit's vocabulary. This resource can be found at: http://www.slideshare.net/qrobinson/21-interactions-ecosystem-notes-ch5-l1?next_slideshow=1

Sample Formative Assessment Tasks/Questions

Additional sample formative assessment tasks/questions for grade bands are located at the end of each of the SEP Support Doc (http://ed.sc.gov/scdoe/assets/File/instruction/standards/Science/Support%20Documents/Complete_2014SEPsGuide_SupportDoc2_0.pdf)

- Develop a rubric to assess learning through Home Sweet Home: STEM terrarium project mentioned in Possible Instructional Strategies/Lessons.

- Sample assessment questions can be found here: http://www.plainlocal.org/userfiles/352/Classes/30369/Ecosystem%20Quiz%201.pdf

Unit Title

Life Science: Interdependent Relationships in Ecosystems

Standard

http://ed.sc.gov/scdoe/assets/file/agency/ccr/Standards-Learning/documents/South_Carolina_Academic_Standards_and_Performance_Indicators_for_Science_2014.pdf

5.L.4 The student will demonstrate an understanding of relationships among biotic and abiotic factors within terrestrial and aquatic ecosystems.

Conceptual Understanding

5.L.4B. All organisms need energy to live and grow. Energy is obtained from food. The role an organism serves in an ecosystem can be described by the way in which it gets its energy. Energy is transferred within an ecosystem as organisms produce, consume, or decompose food. A healthy ecosystem is one in which a diversity of life forms are able to meet their needs in a relatively stable web of life.

New Academic Vocabulary

Some students may need extra support with the following academic vocabulary in order to understand what they are being asked to understand and do. Teaching these terms in an instructional context is recommended rather than teaching the words in isolation. A great time to deliver explicit instruction for the terms would be during the modeling process. Ultimately, the student should be able to use the academic vocabulary in conversation with peers and teachers. These terms are pulled from the essential knowledge portion of the Support Doc 2.0 (http://ed.sc.gov/instruction/standards-learning/science/support-documents-and-resources/) and further inquiry into the terms can be found there.

Habitat	Competition	Limiting factors	Niche	Predator
Prey	Parasite	Host		

Performance Indicators

Text highlighted below in *orange* and *italicized/underlined* shows connections to SEP's

5.L.4B.1 *Analyze and interpret data* to explain how organisms obtain their energy and classify an organisms as producers, consumers (including herbivore, carnivore, and omnivore), or decomposers (such as fungi and bacteria).

5.L.4B.2 *Develop and use models* of food chains and food webs to describe the flow of energy in an ecosystem.
5.L.4B.3 *Construct explanations* for how organisms interact with each other in an ecosystem (including predators and prey, and parasites and hosts).
5.L.4B.4 *Construct scientific arguments* to explain how limiting factors (including food, water, space, and shelter) or a newly introduced organism can affect an ecosystem.

***Science and Engineering Practices**

.Support for the guidance, overviews of learning progressions, and explicit details of each SEP can found in the Science and Engineering Support Doc (http://ed.sc.gov/scdoe/assets/File/instruction/standards/Science/Support%20Documents/Complete_2014SEPsGuide_SupportDoc2_0.pdf). It is important that teachers realize that the nine science and engineering practices are not intended to be used in isolation. Even if a performance indicator for a given standard only lists one of the practices as a performance expectation, scientists and engineers do not use these practices in isolation, but rather as part of an overall sequence of practice. When educators design the learning for their students, it is important that they see how a given performance expectation fits into the broader context of the other science and engineering practices. This will allow teachers to provide comprehensive, authentic learning experiences through which students will develop and demonstrate a deep understanding of scientific concepts.

5.S.1.A.2 Develop, use, and refine models to (1) understand or represent phenomena, processes, and relationships, (2) test devices or solutions, or (3) communicate ideas to others.
5.S.1.A.4 Analyze and interpret data from informational texts, observations, measurements, or investigations using a range of methods (such as tabulation or graphing) to (1) reveal patterns and construct meaning or (2) support hypotheses, explanations, claims, or designs
5.S.1.A.6 Construct explanations of phenomena using (1) scientific evidence and models, (2)conclusions from scientific investigations, (3) predictions based on observations and measurements, or (4) data communicated in graphs, tables, or diagrams.
5.S.1.A.7 Construct scientific arguments to support claims, explanations, or designs using evidence from observations, data, or informational texts

***Cross Cutting Concepts (http://www.nap.edu/read/13165/chapter/8)**

The link above provides support from the Framework for K-12 Science Education: Practices, Crosscutting Concepts, and Core Ideas (2012) The text in blue and *italicized/underlined* below provides a brief explanation of how the specific content ties to the CCC's.

1. Patterns*:* The National Research Council (2012) states "observed patterns of forms and events guide organization and classification, and they prompt questions about relationships and the factors that influence them" (p. 84). *Observe models of food chains and food webs to show the flow of energy in an ecosystem and patterns that emerge.*

2. Cause and Effect**:** The National Research Council (2012) states "events have causes, sometimes simple, sometimes multifaceted. A major activity of science is investigating and explaining causal relationships and the mechanisms by which they are mediated. Such mechanisms can then be tested across given contexts and used to predict and explain events in new contexts" (p. 84). *Observations of how organisms interact in an ecosystem and the effects from the diverse life forms may or may not meet the needs of the ecosystem's ability to be stable. Observations of how organisms interact in an ecosystem and the effects from the diverse life forms that may or may not meet the needs of the ecosystem's ability to be*

stable.

**Teachers have the discretion to enhance the required SEP's and CCC's.*

Prior Knowledge
● 1.L.6A.5 Protists and fungi obtain energy and explore the environment ● 2.L.5B.3 Animal responses to environment (eating behaviors, hibernation, migration)
Subsequent Knowledge
● 6.L.4A.2 Organisms, hierarchical taxonomic structure ● 6.L.5B.2 Plants participate in photosynthesis, transpiration, and respiration

Instructional Strategies/Lessons **Strategies and lessons that will enable students to master the standard and/or indicator.**
● Mold Terrarium Observe blue, green, and white mold grow on leftover food. This resource can be found at: https://www.exploratorium.edu/science_explorer/mold.html ● Deer and Wolf graphing Predator/prey sheet with graph. This resource can be found at: https://www.biologycorner.com/worksheets/predator_prey_graphing.html ● Oh Deer Student game of limiting factors of a deer population. This resource can be found at- http://www.naturebridge.org/sites/default/files/Oh%20Deer_1.pdf ● Owl Pellets-predator/prey Information about owl pellets and activity. This resource can be found at: http://coe.winthrop.edu/pickettl/ELEM%20631/Day%207b%20Owl%20Pellets.pdf
Resources
● Food Chains and Webs Powerpoint of informative information on food chains and food webs. This resource can be found at:- http://www.authorstream.com/Presentation/agroce-1131365-food-chain-and-web/ ● How Energy Moves in an Ecosystem Or Who Eats Who!? Powerpoint food chain-how energy moves. This resource can be found at: http://www.slideshare.net/sth215/food-chains-and-food-webs-259481

- Carnivores, Herbivores and Omnivores Food chain videos. This resource can be found at: http://www.schooltube.com/video/c073166ed77c9950c632/Carnivores-Herbivores-and-Omnivores

- The Web of Life Game This resource can be found at: http://www.amnh.org/ology/features/stufftodo_bio/weboflife_do.php

Sample Formative Assessment Tasks/Questions

Additional sample formative assessment tasks/questions for grade bands are located at the end of each of the SEP Support Doc (http://ed.sc.gov/scdoe/assets/File/instruction/standards/Science/Support%20Documents/Complete_2014SEPsGuide_SupportDoc2_0.pdf)

- Use formative assessment rubrics for examples listed above in Instructional Strategies/Lessons.

- Sample assessment questions can be found here: http://elementaryscience.cmswiki.wikispaces.net/file/view/Ecosystems+Mini+Assessments.pdf

References

Abiotic vs. biotic. (n.d.). Retrieved from http://www.diffen.com/difference/Abiotic_vs_Biotic

Biotic vs. abiotic. (2016). Retrieved from http://www.slideserve.com/lynette/biotic-vs-abiotic

Biotic vs. abiotic factors. (2016). Retrieved from http://www.slideshare.net/letz23/abiotic-vs-biotic-web

Bottle biology. (n.d.). Retrieved from http://www.bottlebiology.org/investigations/terraqua_main.html

Carnivores, herbivores and omnivores. (2013). Retrieved from

http://www.schooltube.com/video/c073166ed77c9950c632/Carnivores-Herbivores-and-Omnivores

Deer: Predation or starvation. (n.d.). Retrieved from https://www.biologycorner.com/worksheets/predator_prey_graphing.html

Ecosystems. (2002). Retrieved from http://www.mbgnet.net/sets/

Food chains and food webs. (2014). Retrieved from http://www.authorstream.com/Presentation/agroce-1131365-food-chain-and-web/

Food chains and food webs. (2016). Retrieved from http://www.authorstream.com/Presentation/agroce-1131365-food-chain-and-web/

Food chains and food webs. (n.d.). Retrieved from

https://sciencebob.com/wp-content/uploads/2015/04/Food-Chains-Food-Webs.pdf?BackLink=6657&https%3A%2F%2Fsciencebob.com%2F

wp-content%2Fuploads%2F2015%2F04%2Food-Chains-Food-Webs.pdf

Hands-on activity: Home, sweet home. (2013). Retrieved from

https://www.teachengineering.org/activities/view/csm_amazon_lesson3_activity1_tg

Interactions in an ecosystem. (2016). Retrieved from

http://www.slideshare.net/qrobinson/21-interactions-ecosystem-notes-ch5-l1?next_slideshow=1

K. Martin (2010). 5th grade ecosystem mini assessment [PDF]. Retrieved August 5, 2016 from
http://elementaryscience.cmswiki.wikispaces.net/file/view/Ecosystems+Mini+Assessments.pdf

Kujawski, D. (2016). Introducing biotic and abiotic factors. Retrieved from

https://docs.google.com/document/d/1q9xMjGmJXo4eprGQe6CQc88o-bGGJOkKLV9S3452Mdc/edit

NatureBridge (2011). Oh deer. Retrieved from https://naturebridge.org/sites/default/files/Oh%20Deer_1.pdf

Plain Local School District (n.d.) Ecocsystem Quiz [Word Document] Retrieved August, 5, 2016 from
http://www.plainlocal.org/userfiles/352/Classes/30369/Ecosystem%20Quiz%201.pdf

Owl pellet investigation. (2010). Retrieved from http://coe.winthrop.edu/pickettl/ELEM%20631/Day%207b%20Owl%20Pellets.pdf

Web of life game. (n.d.). Retrieved from http://www.amnh.org/ology/features/stufftodo_bio/weboflife_do.php